

Application No. 09/888,668

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings of claims in the application:

**LISTING OF CLAIMS:**

1. (Currently Amended) A halftone processor for converting a gray scale image comprising a plurality of  $m$ -bit pixels to a halftoned image comprising a plurality of  $n$ -bit pixel images, where  $m > n$ , the processor comprising:
  - a memory storing a stochastic screen, the screen comprising a set of threshold values; and
  - a comparator receiving the gray scale image and the screen, the comparator comparing, on a pixel-by-pixel basis, a value of each pixel in the gray scale image to a corresponding threshold value in the screen to produce the halftoned image;wherein substantially all the threshold values corresponding to gray levels between  $g_{s1}$  and  $g_{s2}$  coincide with black positions in a constraining checkerboard pattern and substantially all the threshold values corresponding to gray levels between  $g_{s2}$  and  $g_{s3}$  coincide with white positions in the constraining checkerboard pattern, wherein  $g_{s1} > g_{s2} > g_{s3}$  and wherein the gray level  $g_{s3}$  corresponds to a black dither of 50% or less for gray levels  $0 < g_s < 2^m$ , wherein  $g_s = 0$  corresponds to 100% black and  $g_s = 2^m$  corresponds to 0% black.
2. (Original) The processor of claim 1, wherein the halftoned image comprises a plurality of 1-bit pixels.

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3. (Original) The processor of claim 1, wherein the gray level  $g_{s1}$  corresponds to approximately a 5% black dither and the gray level  $g_{s2}$  corresponds to approximately a 40% black dither.

4. (Original) The processor of claim 1, wherein the gray level  $g_{s2}$  corresponds to approximately a 40% black dither and the gray level  $g_{s3}$  corresponds to approximately a 50% black dither.

5. (Original) The processor of claim 1, wherein the gray level  $g_{s1}$  corresponds to approximately a 5% black dither, the gray level  $g_{s2}$  corresponds to approximately a 40% black dither and the gray level  $g_{s3}$  corresponds to approximately a 50% black dither.

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6. (Previously Presented) A method of generating a halftone screen for converting an image received at  $d$  levels, for reproduction at  $c$  levels, where  $d > c$ , the method, in optional sequence, including:

- (A) generating an initial screen pattern for a first gray level, the initial screen pattern being designed to provide a visually pleasing, blue noise dot pattern when thresholded and wherein substantially all black pixels in the initial screen pattern correspond to black pixels in a constraining checkerboard pattern;
- (B) generating a subsequent screen pattern corresponding to a specific gray level that is darker than the first gray level, the subsequent screen pattern maintaining the arrangement of black pixels of any screen pattern corresponding to a lighter gray level and further including at least one more black pixel, wherein the least one more black pixel is at a location corresponding to a black pixel in the constraining checkerboard pattern;
- (C) repeating (B) for a plurality of specific gray levels between the first gray level and a second gray level;
- (D) generating a second subsequent screen pattern corresponding to a specific gray level that is darker than the second gray level, the second subsequent screen pattern maintaining the arrangement of black pixels of every screen pattern corresponding to a lighter gray level and further including at least one more black pixel, wherein the least one more black pixel is at a location corresponding to a white pixel in the constraining checkerboard pattern; and
- (E) repeating (D) for a plurality of gray levels between the second gray level and a third gray level wherein the third gray level corresponds to a black dither of 50% or less.

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7. (Original) The method of claim 6, wherein the first gray level corresponds to approximately a 5% black dither and the second gray level corresponds to approximately a 40% black dither.

8. (Original) The method of claim 6, wherein the second gray level corresponds to approximately a 40% black dither and the third gray level corresponds to approximately a 50% black dither.

9. (Currently Amended) A method for converting a gray scale image received at  $d$  levels, for reproduction at  $c$  levels, where  $d > c$ , the method, in optional sequence, including:

receiving the gray scale image including a plurality of pixels; and  
comparing, on a pixel-by-pixel basis, a value of each of the pixels in the gray scale image to a corresponding threshold value in a stochastic screen;

wherein substantially all the threshold values corresponding to gray levels between  $g_{s1}$  and  $g_{s2}$  coincide with black positions in a constraining checkerboard pattern and substantially all the threshold values corresponding to gray levels between  $g_{s2}$  and  $g_{s3}$  coincide with white positions in the constraining checkerboard pattern, wherein  $g_{s1} \geq g_{s2} \geq g_{s3}$  and wherein the gray level  $g_{s3}$  corresponds to a black dither of 50% or less for gray levels  $0 < g_s < 2^m$ , wherein  $g_s = 0$  corresponds to 100% black and  $g_s = 2^m$  corresponds to 0% black.

10. (Original) The method of claim 9, wherein the gray level  $g_{s1}$  corresponds to approximately a 5% black dither and the gray level  $g_{s2}$  corresponds to approximately a 40% black dither.

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11. (Original) The processor of claim 9, wherein the gray level  $g_{s2}$  corresponds to approximately a 40% black dither and the gray level  $g_{s3}$  corresponds to approximately a 50% black dither.

12. (Previously Presented) The processor of claim 9, wherein the gray level  $g_{s2}$  corresponds to approximately a 40% black dither.

13. (Previously Presented) The processor of claim 9, wherein the gray level  $g_{s1}$  corresponds to black dither of less than 15%.

14. (Previously Presented) The processor of claim 1, wherein the gray level  $g_{s2}$  corresponds to approximately a 40% black dither.

15. (Previously Presented) The processor of claim 1, wherein the gray level  $g_{s1}$  corresponds to black dither of less than 15%.